

PSYCHE.

SOME PSOCINA OF THE UNITED STATES.

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(Continued from p. 196.)

Genus ELIPSOCUS.

THE genus *Elipsocus* is a very natural one. Mr. Kolbe has separated *E. unipunctatus* from the rest as belonging to a different genus *Mesopsocus* Kolbe. This species, it is true, has a peculiar facies, nevertheless the differences do not appear to justify a generic separation, the more as a new species *E. laticeps* Kolbe is perhaps only a variety of *E. unipunctatus*. Both have no hairs on the veins of the wings, which is an exception in *Elipsocus*. The differences quoted by Kolbe for *Mesopsocus* consist chiefly in the venation, and represent differences found as variations in the same species. Among thirty European specimens now before me, twenty have the venation of *Mesopsocus* (*alarum anticarum ramus venae medianae interior ramusque venae submedianae exterior venula transversali conjuncti*, Kolbe); the other ten specimens have both rami united in a point (without the *venula transversalis*); one of them has the rami confluent, as figured by Spangberg, and described as a character of *E. laticeps* by Kolbe. The other differences of the venation quoted by Kolbe are even less important, and occur likewise in *E. unipunctatus*. I may state that my specimens are from Sweden, Eastern

Prussia, Saxony, Posen, Hamburg, and Elberfeld, and that the before mentioned varieties were found together with the normal form.

The claws of the legs of *E. unipunctatus* have a tooth below, before the point, only visible with the compound microscope. The claws are 0.05 mm. long, the tooth 0.003 mm. The basal third of the claw is enlarged below, forming a prominent edge. I remark that the nearly related genus *Caecilius*, except *Pterodela*, has no tooth on the claws in living and fossil species, and is, as far as my observation goes, the only one with toothless claws. The genital appendages of the male of *E. unipunctatus* are covered by a large spoon-shaped valve, which is bluntly pointed above; the appendages black, somewhat incurved, narrow, truncated on tip; the external border truncated in the middle, therefore not reaching the tip. The penis appears to be long and stiletto-shaped.

In the Synopsis of the Neuroptera of North America, p. 9, at no: 3, *Psocus signatus*, I have stated my doubts concerning the distinctness of this species from *Ps. immunis* Steph. (= *unipunctatus*). There are before me five specimens from Massachusetts and New York, which, after a

very detailed examination, I am unable to separate from the European species. The slight differences of the venation, spoken of before, occur also among the North American specimens. The identity of the species is made more sure by the fact that short-winged specimens are found in Europe and in North America, and that till now *E. unipunctatus* is the only species of which short-winged specimens are known. I possess three specimens from Eastern Prussia, found together with the long-winged specimens, and two from New York, which I received together with the types of *Ps. signatus*.

Mr. Kolbe is inclined to doubt the existence of short-winged specimens (Monogr. deutsch. Psociden, p. 95), and therefore I may give here some more detailed information. The specimens agree exactly with the figure given by Westwood, *Introd.*, v. 2, f. 59, no: 13, 14, 15. The only difference is the absence of ocelli according to Westwood's statement, but I think that probably he used a lens of low power. The ocelli are easily seen with the compound microscope; they do not stand upon a circular elevation as in the long-winged specimens, but upon the flat surface of the head. The cornea is very little convex, but sharply defined around its border, and shining; the anterior ocellus is smaller, and in one specimen the cornea is like a dull membrane. In another specimen this ocellus is deepened, but a small shining cornea is visible in the hole. The diameter of the two posterior ocelli is 0.04 mm.; the anterior is smaller. I saw Westwood's type years

ago, but did not examine the ocelli, which are very easily overlooked without the use of a compound microscope.

The rudiments of the wings are small ovoid scales, attached to the external margin of the mesothorax and to the metathorax with a very short stem, and not with a broad base as commonly in the nymph state. The scales lie close to the thorax and are scarcely longer than the segment to which they belong; they are opaque, chitinous, only the apical half thinner and somewhat transparent, yellow as the main color of the body of the insect, without veins, but with a darker middle stripe; the border around the scale somewhat thicker.

The head of the short-winged specimens and the large eyes are similar to those of the normal form, excepting the want of the circular elevation bearing the ocelli. The antennae hairy but thinner. Size, body and legs as in the normal form. The genitals are not to be observed surely in the dry specimens, but seem to be similar to those of the normal form. One is surely, three are probably male; one seems to be a female, and the eyes are more separated. I think the appearance of such specimens is by no means exceptional, as similar short-winged imagos are known to exist among the *termitina* and *perlina*. They are imagos with rudimentary wings.

I remark that I had accepted for the species the name *E. aphidiodes* Schrank, because it is doubtless sure, though Mueller's name *E. unipunctatus*, the identification of which was first pointed out by myself, is only probably sure.

Psocus venosus Burm.

The species is found everywhere from Canada down to the Gulf of Mexico and occurs also in Cuba. I do not know whether it is found west of the Rocky Mountains or not. It appears to live gregariously, sometimes in large numbers, on apple trees, in all different stages. As it is here the largest species, I have tried to study it carefully, and give here a short notice of some entirely new characters, which may be observed partly in other species.

The wings of *Psocus* have mostly been treated of in a rather summary manner. The venation is considered in a different way by different writers, but a satisfactory study of the species not belonging to the European fauna has thus far been wanting, and such a study will probably lead to better knowledge. I use here, for convenience, the nomenclature adopted by Mr. Kolbe in his new monograph, reserving until a future time and as the result of farther advanced study, the introduction of some changes. I would here draw attention to a few characters, which I find nowhere mentioned.

1. At the extreme base of fore and hind wing of *Psocus venosus* (and several related species), just below the the subcosta, there is a darker, more chitinous place, bordered below by the median vein and ending in front about where the submedian begins. Examined with a rather strong lens, this place (0.2 mm. long) has the appearance of a sieve with numerous round holes of 0.003 mm. diameter, arranged in a series of longitudinal lines, not strictly keeping in the lines. In changing the focus, every hole is found

to have a small sensitive bristle in the centre. The whole arrangement is similar to that on the base of the wings of diptera or on the antennae of insects, described long ago, and presumed to represent the sense of hearing. I have hitherto been unable to prove the presence of nerves and ganglia in this place, but such will be found without doubt. In full grown nymphae I was able to see the same arrangement, but in a less definite shape. The small holes have not such sharp borders in the nymphae as in the imagos, and the middle elevation seems to be larger than in the imago.

2. The wings of full-grown nymphae, while still contained in the wing case, show nearly the whole venation indicated by paler lines, representing the veins, which are blood vessels. Around the margin of the whole forewing runs a broad sinus (0.016–0.023 mm.), with which the other veins are connected. The whole wing is dull, not hyaline, pale grayish, densely filled with cells. The tracheae are very small (0.0017 mm. diameter against 0.005 in the imago), often only indicated, and the spiral thread not visible or replaced by transverse nuclei. In an earlier stage there is found as the first indication of a trachea, one series of cells arranged in a band. The trachea forming the analis of Kolbe is always broader (0.0025 mm. diameter, against 0.03+ in the imago). The analis belongs to the underside of the wing and is, as far as I know, the only one not accompanied by a blood vessel, and formed only by a trachea for purposes later to be spoken of. The hind border of the wing case has two series

of long bristles (0.104 mm. long).

Specimens just after transformation show the wings hyaline but somewhat milky. The larger veins and the pterostigma are filled with a large number of blood-cells. The two membranes of the wings, even in the imago state, are less firmly glued together than in other insects, and easily separated if the wing is touched roughly or glued with one side on paper or glass. The membranes of the hind wings are still less firmly connected than those of the forewings. In going through a moderately large collection of *Psocus*, specimens will be found showing a separation of the two membranes at least in some parts. The same is often to be seen in fossil species included in amber or in copal.

All veins show numerous short appressed hairs, the longest on the marginal vein around the wing (0.009 mm. long). The only vein without any clothing of hairs is the analis. The whole membrane of the wing is beset more or less densely with similar but much smaller hairs (the longest 0.003 mm.).

It is a fact new to me that the whole venation, with the exception of the subcostalis and analis, consists of a double net, not only of veins, as I have proved long ago, but also of tracheae, one net belonging to the upper membrane, the other to the lower one. Both are exactly alike and cannot be seen when the two membranes are firmly glued together. When separated, which occurs more easily in the hind wings, both nets are clearly visible, and each trachea of the upper membrane joins the corres-

ponding one of the lower membrane in a loop at the margin. I have to remark that the tracheae seem only in juxtaposition to the blood veins, at least I have established this undoubtedly in the case of the mediana. A more detailed study of the origin of the veins will probably give a more certain basis of facts for identifying the value of the veins, and for contributing to a better founded nomenclature. For instance, the ramus medianae interior in the hind wings is united with the ramus submedianae exterior at the base of the wing, and both can only be considered to be the two branches of the same vein. In the forewing the ramus medianae interior is a branch of the mediana and the ramus submedianae exterior a branch of the submediana. The mediana originates from the anterior basal wing-callus, the submediana from the posterior wing-callus; nevertheless both veins are connected by a tracheal loop at the extreme basis of the wings. I have purposely given this in such detail, because the whole disagreement about the nomenclature of the veins between McLachlan and Kolbe consists in this point. But I have not yet finished my studies to a point satisfactory to myself, so as to emit a positive opinion about those veins.

The somewhat loose connection of the two membranes of the wings, and the fact that the tracheae are double and constitute, for a very large part, the venation, easily explains the very frequent variations and warns us to use such differences only or chiefly for generic separation. (To be continued.)